What Vivisection Has Done for Humanity

W. W. KEEN, M.D., LL.D.
PHILADELPHIA

DEFENSE OF RESEARCH
PAMPHLET XIV

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"The humanity which would prevent human suffering is a deeper and truer humanity than the humanity which would save pain or death to animals."—*Charles W. Eliot.*

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Pamphlet

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WHAT VIVISECTION HAS DONE FOR HUMANITY*

W. W. KEEN, M.D., LL.D.
PHILADELPHIA

PREFACE

It is not too much to say that Dr. Keen, of Philadelphia, is universally regarded to-day in the world of surgery as the foremost of living American surgeons. The leading universities and academies of science of the United States, England, France and Germany have honored him with their degrees and honorary titles, and the published works on surgery, written and edited by him, are accepted as standard authorities by the profession in which he has gained such eminent distinction. Dr. Keen is, therefore, as well, if not better, qualified to to present the advantages of vivisection as any American writer on the subject.—THE EDITORS *of the Ladies' Home Journal.*

In 1905 I had made all my arrangements to do an operation on a Thursday morning. Among my assistants was Dr. C. On Wednesday morning he telephoned and said he was not feeling very well and that I had better engage some one to take his place. This I did, giving no special thought to the matter, supposing it was an unimportant passing illness. At ten o'clock that same night I was startled by a telephone message that if I wished to see Dr. C. alive I must come at once! In a few minutes I was there, but he was already unconscious. As I sat beside him and his weeping young wife, who soon expected to become a mother, how I longed for some means by which the hand of death could be stayed; but he died in less than thirty-six

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hours from the time that he was seized with cerebrospinal meningitis.

On June 16, 1909, Charles E. Hughes, Jr., son of the governor of New York State, and president of his class, was graduated at Brown University. A few weeks earlier he had been suddenly seized with a violent attack of the same disease—cerebrospinal meningitis. When some of the fluid around his spinal cord was removed by "lumbar puncture"—that is, puncture of the spinal canal in the small of the back by a hypodermic needle—there settled to the bottom of the test-tube a half inch of pure pus ("matter"). No medical man familiar with this terrible disease would have thought it possible that he could recover when such a condition existed. But in 1907, midway between the death of Dr. C. and the case of young Hughes, Drs. Flexner and Jobling, of the Rockefeller Institute, had discovered by researches on animals alone a serum against this disease. Three doses of this serum were administered also by "lumbar puncture" to young Hughes. Within twenty-four hours after the first dose his temperature fell to normal. The pus disappeared after the second dose and he soon recovered and was able to take his degree in the presence of his proud father. The tragedy in the case of Dr. C. was averted, a useful life was spared, and a family made happy.

GREAT DECREASE IN MORTALITY FROM CEREBROSPINAL MENINGITIS

In discovering this serum Dr. Flexner experimented on twenty-five monkeys and one hundred guinea-pigs. Many of these animals themselves had been cured by the use of the serum. Having, therefore, found it effective in animals he proceeded to test it on human beings. Before the introduction of the serum, medicine was almost helpless. Whatever treatment was adopted seventy-five to ninety patients out of one hundred were sure to die. In two years this serum has been used in this country and in Europe in about one thousand cases. In these one thousand cases the mortality has dropped to thirty, twenty, ten, and even to seven in a hundred. If we take the mortality of the days before the serum treatment was used at 75 per cent., and the mortality since it was discovered at 25 per cent., there is a clear saving of 500 human lives!

Not only have 500 human lives been saved in these first one thousand cases, but for all time to come in every thousand 500 more human lives will be saved.

Moreover, we must not forget that these thousands who would die were it not for Dr. Flexner's serum had families and friends who would have been filled with sorrow, and, in case it was the breadwinner of the family whose life was lost, would have had to suffer the deprivations and pangs of poverty.

Let me now put a plain, straightforward, common-sense question. Which was the more cruel: Doctor Flexner and his assistants who operated on twenty-five monkeys and one hundred guinea-pigs with the pure and holy purpose of finding an antidote to a deadly disease and with the result of saving hundreds, and, in the future, of thousands on thousands of human lives; or the women who were "fanned into fury" in their opposition to all experiments on living animals at the Rockefeller Institute, "no matter how great the anticipated benefit"?

If these misguided women had had their way they would have nailed up the doors of the Rockefeller Institute, would have prevented these experiments on 125 animals, and by doing so would have ruthlessly condemned to death for all future time 500 human beings in every one thousand attacked by cerebrospinal meningitis!

If your son or daughter falls ill with this disease to whom will you turn for help—to Flexner or to the anti-vivisectionists?

Of these one hundred and twenty-five animals, as a rule those which died became unconscious in the course of a few hours and remained so for a few hours more till they died. They suffered but little. When they died they left no mourning families and friends. They left undone no deeds of service or of heroism to either their fellows or to the human race, as the human beings whose lives were rescued by their death may do. But these deluded women had their minds so centered on the sufferings of these one hundred and twenty-five animals that their ears were deaf and their hearts steeled against the woes and the sufferings of thousands of human beings, their families, and their friends. Is this common-sense? Are not human beings "of more value than many sparrows"?

Less than two years ago their first baby was born to a young doctor and his wife in New York City. Scarcely was the child born before it began to bleed from the nose, the mouth, the gums, the stomach and the bowels. It was a case which we known as "hemorrhage of the newborn," which attacks about one baby in every thousand. It is very frequently fatal, and in treating it up to that time physicians practically groped in the dark, trying one remedy after another, but, alas, too often in vain!

The bleeding continued. This poor little baby soon showed the pallor which accompanies severe loss of blood. It lost all appetite, was suffering from high fever, and, finally, by the fourth day the physician in attendance told the parents frankly that the child could live only a few hours. Then, in the dead of the night the father wakened Dr. Carrel, one of the assistants in the Rockefeller Institute. The father lay down alongside of his firstborn. The artery of the pulse in the father's arm was laid bare and sewed end-to-end to a vein in his baby's leg, and the blood was allowed to flow from father to child. The result was most dramatic. A few minutes after the blood began to flow into the baby's veins, its white, transparent skin assumed the ruddy glow of health, the hemorrhage from every part of the body ceased instantly and never returned, and, as Dr. Samuel Lambert, who reports the case, puts it, there was no period of convalescene; immediately before the operation the baby was dying; immediately after the operation it was well and strong and feeding with avidity. That baby to-day, after two years, as I know personally, is a splendid specimen of a healthy child.

Perhaps my readers may see nothing very wonderful in this, but we surgeons know that it is one of the most remarkable recent achievements in surgery. For many years we have been trying to devise a method by which we could sew severed blood-vessels end-to-end without danger to the patient. The difficulty has always been that, no matter what were the methods employed, the blood nearly always formed clots at the roughened ring where the two ends of the divided blood-vessel were sewed together. These clots passed up to the heart and into the lungs of the patient and produced pneumonia, so that the old method of transfusion of blood has been

practically abandoned for years. Dr. Carrel worked out his new method on the blood-vessels of dead human beings, and, when it seemed to him to be satisfactory, put it to the proof on two living dogs, and then used it in living human beings. It is now in use everywhere.

Moreover, Dr. Crile, of Cleveland, who has so splendidly enlarged our means of coping with disease, has used the same method in another way. When patients come to him too weak to be operated on and ordinary tonics and food do not strengthen them, he has transfused the blood from husband, father or son, and thus given the patient sufficient strength to bear the operation. He has used even a more striking method. For example when a woman has to be operated on—say for cancer of the breast—and is so weak that the shock, the anesthetic and the loss of blood would probably turn the scale against her, he has had the husband lie down alongside of her, has sewed the artery of the pulse of the husband to a vein in his wife's leg and allowed the blood to flow. In a few minutes, when she has become strong enough, he has etherized her and proceeded with the operation, starting or stopping the flow of blood according to the varying needs of the patient. At the end of the operation, through the new life-blood that has been given her, the patient has been in better condition than when the operation began. These methods, too, are now in successful use by other surgeons.

Let me again put the plain, straightforward, common-sense question: Who is the more cruel: Dr. Carrel, in devising this life-saving method of transfusion of blood by experimenting on two living dogs, and saving through himself and other surgeons scores of lives already, and even thousands in the future; or the women who would shackle him, shut up the Rockefeller Institute and thrust these poor patients into their graves? Does not the work of Drs. Flexner, Jobling and Carrel and their assistants not only justify the existence of the Rockefeller Institute, but also bid us tell them Godspeed in their mission of mercy, and give them and those engaged in similar blessed work all over the world our confidence, encouragement and aid? Is it just, is it fair, is it Christian to call such an institution a "hell at close range," as the Rockefeller Institute is called in a pamphlet written by a woman and distributed by antivivisectionists?

ANTISEPTIC EXPERIMENTS WERE FIRST TRIED ON ANIMALS

I suppose that in this day of general intelligence scarcely any person, if he or she had to submit to an operation, would be willing to have it done by a surgeon who did not use antiseptic methods. These methods we owe to Lord Lister of London, still living in his eighty-third year. Few of my readers, however, know how enormous the contrast is between the days before Lister's discoveries and the present. I was graduated in medicine in 1862. The antiseptic method was adopted by various surgeons, we may say roughly, between the years 1875 and 1880. Prior to 1876 I practiced the old surgery, but ever since then the new antiseptic method. I passed through the horrible surgery of the Civil War, when blood-poisoning, erysipelas, lockjaw, hospital gangrene and all the other fearful septic conditions were every-day affairs. In five hundred and five cases of lockjaw during the Civil War four hundred and fifty-one patients died. In wounds of the intestines the mortality was ninety-nine out of a hundred. In sixty-six cases of amputation at the hip-joint fifty-five patients died. In one hundred and fifty-five cases of trephining ninety-five patients died. After the war for some years I was an assistant of Dr. Washington L. Atlee. A more careful surgeon I never saw, but two out of every three of his patients died. There are now many surgeons who can show series of hundreds and even thousands of cases of ovariotomy and other abdominal operations with a mortality of only five in a hundred, and some of only one in a hundred. After "clean" operations—that is, with no "matter" present—blood-poisoning, lockjaw and erysipelas are well-nigh unknown, and I have not seen a single case of hospital gangrene in the thirty-five years since I adopted the antiseptic method.

One of the most common operations is amputation of the breast for cancer, in which now we do far more extensive operations than formerly. These operations are followed by permanent cure in more than one-half of the patients operated on early, and rarely more than one or two women in every hundred die. Recovery also follows in a few days and not seldom with but little pain, instead of several weeks or even months of great suffering as before the days of antisepsis.

All of this wonderful improvement we owe to Lord Lister and the new science of bacteriology which treats of "bacteria" or "germs." Both Lister's work and that of the bacteriologist are and must be absolutely founded finally on experiments on animals. The laboratory was of use, but, in order to be absolutely certain that he was right he had to experiment on a few animals—the only possible way of achieving positive knowledge.

Who, I ask, are the more humane: Lord Lister and other surgeons who have made these life-giving, pain-saving experiments on animals, or those who—if they had succeeded in the past in prohibiting such experiments—would have compelled surgeons in 1910 to continue to use the same old, horrible, dirty methods of surgery as in the days before Lister, and thus to offer up hecatombs of human lives to the Moloch of antivivisection? Which method will any man of common sense or any woman with a human heart choose?

HOW THE SCOURGE OF MOTHERHOOD HAS BEEN BANISHED

Even in surgery it is doubtful if a more wonderful improvement has been realized than in our maternity hospitals and in private obstetric practice as a direct result of the work of Pasteur and Lister. Well do I remember as a young man every now and then an outbreak of that frightful and fatal puerperal or "child-bed" fever in our maternity hospitals. Almost every woman who then entered such a hospital was doomed to suffer an attack of the fever, and its mortality sometimes ran up to seventy-five, or even more, out of every hundred mothers. Often such hospitals had to be closed till the then unknown poison disappeared. Not a few obstetricians had to quit practice entirely for weeks because every woman they attended fell ill of the disease and many, many died. Finally Pasteur appeared on the field. In 1878, in a discussion on puerperal fever at the Paris Academy of Medicine, after a member had eloquently discussed various alleged causes of these epidemics, Pasteur interrupted him and said: "All this has nothing to do with the cause of these epidemics. It is the doctors who transport the microbe from a sick woman to a healthy woman." When the speaker responded that he feared they would never find this microbe Pasteur immediately advanced to the blackboard, drew the picture of what we know as the "streptococcus" and said: "This is the cause of the

disease." This recognition of the streptococcus as the cause of puerperal fever and the consequent adoption of antiseptic methods have practically abolished puerperal fever and reduced the mortality in maternity cases to less than one in a hundred.

All this we owe absolutely to experiment on animals. Nothing else could have given us the knowledge. Even the horrible experiments that were being made by doctors who were ignorantly spreading the poison all around them, even these were not sufficient to open our eyes to the real cause of the disease. The laboratory test-tubes and experiments on animals were the chief means by which this scourge of motherhood has been banished.

EXPERIMENTS ON MAN HAVE VANQUISHED YELLOW FEVER

In addition to all these another fearful disease, yellow fever, has also been abolished by experiment which was necessary for the final convincing proof. I need not repeat at length the frightful ravages of this terrible pestilence in days gone by. Cuba was never free from it for nearly two centuries until the American Commission showed how to get rid of it. The Panama Canal Zone had perhaps the worst reputation in the world as a graveyard for strangers, and now for four years not a single case of yellow fever has originated there! Colonel Gorgas has made the Panama Canal a possibility.

I wish that every one might read that most interesting little book, "Walter Reed and Yellow Fever," by Dr. Howard A. Kelly, and see the wonderful methods by which this scourge of humanity has been abolished. When one thinks of the enormous difficulties of the problem the wonder is that it was ever solved. There are about 400 hundred varieties of mosquito. Only one of them carries the poison of yellow fever. Of this variety only the female carries the poison, and this female mosquito must have bitten a patient sick with yellow fever during the first three days of his illness, or she could not become infected. Moreover, after infection, the poison, whatever it is, does not develop in the body of the female mosquito for about twelve days. These facts were thought to be true, but there was no

positive proof. A very large number, perhaps the majority, of yellow-fever experts still believed that the disesase was carried in clothing, bedding, etc. To disprove this experiments were tried first of all by doctors on themselves. They slept in the beds in which yellow-fever patients had died, and in their very clothes, night after night—clothes soiled with their black vomit, urine and feces. At other times doctors have actually swallowed the black vomit, tried to inoculate themselves by putting some of it into their eyes, by hypodermic injections, etc., in the vain attempt to discover the cause of the disease and the means by which it was spread, hoping in this way to discover the means of preventing it. Surely self-sacrifice could go no further. Yes, it could go further. One more step was requisite. The only way to give the absolute final proof was for a well man to be bitten by a mosquito known to be infected. Dr. Carroll, of the United States Army, was the first one who offered himself. Other men followed —doctors, soldiers and others. Several lost their lives, among them Dr. Lazear at the beginning of a most promising career. His tablet in the Johns Hopkins Hospital, in the fine words written by President Eliot, records that "With more than the courage and the devotion of the soldier he risked and lost his life to show how a fearful pestilence is communicated and how its ravages may be prevented."

It is often said that such experimental work brutalizes men. Let us read a letter from Dr. Reed to his wife, remembering, also, that the same high and holy purposes animate Doctors Flexner, Carrol, Crile and other experimenters:

QUEMADO, CUBA, 11:50 p. m., Dec. 31, 1900.

Only ten minutes of the old century remain. Here have I been sitting, reading that most wonderful book, "LaRoche on Yellow Fever," written in 1853. Forty-seven years later it has been permitted to me and my assistants to lift the impenetrable veil that has surrounded the causation of this most wonderful, dreadful pest of humanity and to put it on a rational and scientific basis. I thank God that this has been accomplished during the latter days of the old century. May its cure be wrought out in the early days of the new! The prayer that has been mine for twenty years, that I might be permitted in some way or at some time to do something to alleviate human suffering, has been granted!

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This prayer of Reed—that its cure might be wrought out in the new, the twentieth century—has been abundantly realized and yellow fever is now a vanquished foe.

Unfortunately, the lower animals cannot be infected with yellow fever. If they could be Lazear and the other victims would have been saved. But they, yielding up their lives as leaders of a forlorn hope in the battle against disease, have made it possible to free the world from this dreadful scourge. Never was there a finer exhibition of courage!

WHY MODERN SURGERY IS SUCCESSFUL IN BRAIN DISORDERS

A few years ago I was called to Annapolis to see a young man who had been injured in a football game. He was evidently swiftly going to his grave. He had certain peculiar symptoms, which, in the light of cerebral localization—that is, the fact that certain definite portions of the surface of the brain have each a certain definite function—I believed to be due to a clot of blood inside of his head above his left ear. There was a bruise, not above the ear, but at the outer end of the left eyebrow. Before 1885 I should have opened his skull under the bruise—apparently the almost certain point of injury—would have failed to find the clot, and he would surely have died. Instead of this I made a trap-door opening 3 inches away from this bruise, removed nine tablespoonfuls of clotted blood, closed the wound so that his skull was as firm as ever, and he recovered, continued his studies, was graduated from the Naval Academy. Lately he has heroically given up his life at the call of duty. Had it not been for experiments on animals which had definitely fixed certain spots in the brain as the centers for movements of the hand, arm, shoulder, head, face, etc., it would have been utterly impossible for me to save his life. This is but one of hundreds of similar cases in which modern surgery deals with tumors of the brain, hemorrhage inside of the skull and many other disorders, and deals with them successfully.

THE GREAT BLESSINGS OF ANTITOXIN IN DIPTHERIA

I have heard the following pitiful story from one of my colleagues. He and a young mother stood by the bedside of her only child. The child, in the throes of diphtheria, was clutching at its throat and gasping

vainly for breath. Suddenly the mother flung herself on the floor at the doctor's feet in an agony of tears, entreating him to save her child. But alas! it was impossible. Had this case ocurred a few years later, however, when the blessed antitoxin for diphtheria had been discovered (solely by animal experimentation), this remedy would have been given early; and almost certainly within a few hours the membrane would have softened and disappeared, and that life, precious beyond rubies, might have been saved.

In those early dreadful days the only comfort we could give such distracted mothers—possibly some of them may read these very lines—was that "it was God's will." Yes! Then, possibly, it was God's will; but now, thank God, it is not His will. One might as well say it is God's will that thousands should die from smallpox when vaccination will protect them; that other thousands should die from typhoid fever when a pure water-supply and the banishment of the fly will prevent it; that thousands of women should die from puerperal fever when sterile hands and sterile instruments will save them!

Let me give a table of some official reports showing in nineteen American and European cities the mortality in every 100,000 inhabitants from diphtheria in 1894—that is to say, before the use of the antitoxin of diphtheria—and in 1905, when its use had become general. Being official and from ninteen cities in America and Europe, its accuracy can hardly be assailed.

TABLE OF MORTALITY FROM DIPHTHERIA

	Per 100,000 Inhabitants.	
	1894.	1905.
New York	158	38
Philadelphia	128	32
Baltimore	50	20
Boston	180	22
Brooklyn	173	43
Pittsburg	64	26
London	66	12.2
Paris	40	6
Vienna	114	19

These nine and ten other large cities taken together average as follows; in 1894, 79.9, and in 1905, 19, per 100,000 inhabitants—that is to say, in these nineteen cities the average death rate in 1905 was less than one-fourth of the rate before the introduction of the serum treatment.

VIVISECTION IS NEVER UNNECESSARILY CRUEL

The alleged atrocities so vividly described in antivivisection literature are fine instances of "yellow journalism," and the quotations from medical men are often misleading. Thus, Sir Frederick Treves, the eminent English surgeon, is quoted as an opponent of vivisection in general. In spite of a denial published seven years ago the quotation still does frequent duty. I know personally and intimately Horsley, Ferrier, Carrel, Flexner, Crile, Cushing and others, and I do not know men men who are kinder and more lovable. That they would be guilty of deliberate cruelty I would no more believe than that my own brother would have been.

Moreover, I have seen their experiments, and can vouch personally for the fact that they give to these animals exactly the same care that I do to a human being. Were it otherwise their experiments would fail and utterly discredit them. Whenever an operation would be painful an anesthetic is always given. This is dictated not only by humanity, but by two other valid considerations: first, long and delicate operations cannot be done properly on a struggling, fighting animal any more than they could be done on a struggling fighting human being, and so again their experiments would be failures; and second, should any one try an experiment without giving ether he would soon discover that dogs have teeth and cats have claws. Moreover, it will surprise many of my readers to learn that of the total number of experiments done in one year in England 97 per cent. were hypodermic injections and only 3 per cent. could be called painful!

If any one will read the report of the recent British Royal commission on Vivisection "he would find," says Lord Cromer, "that there was not a single case of extreme and unnecessary cruelty brought forward by the Antivivisection Society which did not hopelessly break down under cross-examination."

EXPERIMENTAL RESEARCH IS OUR DUTY

In view of what I have written above—and many times as much could be added—is it any wonder that I believe it to be a common-sense, a scientific, a moral and a Christian duty to promote experimental research? To hinder it, and, still more, to stop it would be a crime against the human race itself, and also against

animals, which have benefited almost as much as man from these experiments.

What do our antivivisection friends propose as a substitute? Nothing except clinical—that is, bedside—and post-mortem observations. These have been in use for two thousand years and have not given us results to be compared for a moment with the results gained by experimental research in the last fifty, or even the last twenty-five years.

Finally, compare what the friends and the foes of research have done within my own professional lifetime. The friends of research have given us antiseptic surgery and its wonderful results in every region and organ of the body; have abolished, or nearly abolished, lockjaw, blood-poisoning, erysipelas, hydrophobia, yellow fever; have taught us how to make maternity almost absolutely safe; how to reduce the mortality of diphtheria and cerebrospinal meningitis to one-fourth and one-third of their former death-rate, and have saved thousands of the lower animals from their own special diseases.

What have the foes of research done for humanity? Held meetings, called the friends of research many bad names and spread many false and misleading statements. Not one disease has been abolished, not one has had its mortality lessened, not a single human life has been saved by anything they have done. On the contrary, had they had their way, puerperal fever and the other hideous diseases named above, and many others, would still be stalking through the world, slaying young and old, right and left—and the antivivisectionists would rightly be charged with this cruel result.

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